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Subject:comments to NPRM Licensing and Safety requirements for launc

Ron

Per our telecon, here are comments to the NPRM Licensing and Safety requirements for operation of a launch site.

If you have questions please call me.

Lou


summary doc


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Comments on DOT NPRM Licensing and Safety requirements for Operation of a Launch Site
Docket Number FAA-1999-5833: Notice 99-07
(Lou Gomez 505-525-5668)

General Comments:

1. For the most part, the draft requirements do not include the launch of Reusable Launch Vehicles (RLVs) or unproven vehicles. The FAA plans to review these on a case-by-case basis. This is good and is bad. From a positive viewpoint, it avoids imposing expendable vehicle requirements on sites planned for RLV operations. However, it requires the RLV site operators to guess what the FAA will look for in the license applications. An operator could spend a lot of money and time preparing an application, only to find that the application is incomplete or the site unacceptable. We understand the FAA's reluctance to venture into uncharted territory; however, We believe they should provide more in the way of guidelines for RLV-only sites.

2. The proposed regulations relate only to launch operations. We suggest that the proposed regulations be expanded to include recovery operations.

Specific comments

Page 8. "The safety rules, procedures and practice, in concert with the safety functions of the federal launch ranges, have been assessed by the FAA, and found to satisfy the majority of the FAA's safety concerns. In contrast, when launching from a non-federal launch site, a launch operator's responsibility for ground and flight safety takes on added importance. In the absence of federal launch range oversight, it will be incumbent upon each launch operator to demonstrate the adequacy of its ground and flight safety to the FAA." This is interesting. It seems to say that the FAA is willing to accept a double standard on safety. NM will be treated differently from Florida and California because their launch sites are federal, and New Mexico's isn't. Which safety concerns will Florida and California not have to satisfy?

Page 12. "In contrast, the proposed regulations require the submission of an explosive site plan, but impose fewer operational ground safety responsibilities on a launch site operator." Later pages define the process in detail. Overall, it would appear that this issue would be better left to other agencies such as OSHA, ATF, and state licensing organizations. Vast quantities of LOX, LH2, N_2O_4, and other materials are shipped and used in interstate commerce. Why single out the launch industry for special regulations? Why should they treat explosive hazards distinctly from the potential hazards associated with ignition by static electricity as defined on page 38: "Although the control of static electricity is important for public safety, the FAA is not proposing any requirements in this rulemaking. The FAA believes that the control of static electricity in launch operations is primarily procedural in nature, and is best covered by the FAA in a future rulemaking on launches. The FAA is interested in the public's view on whether requirements should be placed on launch site operators." On the good side, the QD tables seem to be based on much more reasonable information than the old DOD tables we used previously.

Page 16. Last sentence of Section A reads "The FAA will revisit ground safety issues in its development of rules for launches from non-federal launch sites". Is this an indication that they will be different from those of a Federal Range?

Page 16. Much of the safety aspects of ground safety with regard to handling explosives that deal with aspects beyond the Q-D questions have to do with operations and training (human impacts). Not much was mentioned about this subject.This is also true of static discharge events that are not caused by lightning. We suggest this is the site operator's responsibility to ensure that procedures are in place to preclude human error accidents involving explosive materials and static discharge events. An example of this type of procedure is the strict limiting of RF emissions once initiators ("squibs") are armed.

Page 17. “An applicant may acquire property for future use as a launch site; however, absent a FONSI, the FAA must prepare an environmental review that includes consideration of reasonable alternatives to the site. According to the CEQ regulations as interpreted by the courts, an applicant may not use the purchase of a site or construction at the site to limit the array of reasonable alternatives. As a result, an applicant must complete the environmental process before construction or improvement of the site. The issue of alternative sites should also include consideration for safety, scientific, financial, and finally environmental reasons.

Page 4 1. “The FAA intends a launch site location review to determine whether the location of a proposed launch site would jeopardize public health and safety. To that end, the FAA proposes to determine whether at least one hypothetical launch could take place safely from a launch point at the proposed site. Does the applicant have to show that the corridor is a reasonable one? -- that there is a potential customer for the corridor?

Page 43. “Bear in mind also that the focus of FAA’s proposed launch site location review methods is on expendable launch vehicles with a flight history. The reusable launch vehicles (RLV) currently proposed by industry varies quite a bit. Accordingly, the FAA considered it unwise to define a detailed analytical method for determining the suitability of a launch site location for RLVs. An applicant proposing a launch site limited to the launch of reusable launch vehicles would still need to define a flight corridor and conduct a risk analysis if population were present within the flight corridor, but the FAA will review such an analysis on a case-by-case basis consistent with the principles discussed in this rulemaking.“. Good start, but it appears RLVs are still not looked at as a credible possibility.

Page 44. “The FAA proposes to have an applicant who anticipates customers who use guided orbital launch vehicles define a flight corridor for a class of vehicles launched from a specific point along a specified trajectory, that extends 5,000 nautical miles from the launch point or until the launch vehicle’s instantaneous impact point leaves the earth’s surface, whichever is sooner.” This seems reasonable. However, throughout the rest of the proposed regulations, the FAA requires analyses out to 5,000nm. We suggest that the analyses be required only to the point where the vehicle’s IIP leaves the earth’s surface, if it is shorter than 5,000nm.

Page 46. “The FAA’s proposed methods for identifying a flight corridor or impact dispersion areas distinguish between guided orbital launch vehicles with a flight termination system (FTS), guided sub-orbital launch vehicles with an FTS, and unguided sub-orbital launch vehicles without an FTS.’ For purposes of this proposal, references to a guided launch vehicle, whether orbital or sub-orbital, may be taken to mean that the vehicle has an FTS. References to an unguided sub-orbital may be understood to mean that the vehicle does not possess an FTS.” This does not accommodate RLVs very well.

Page 54. Last sentence reads. “ ..because a launch licensee will need to assure the adequacy of ground tracking”. What distinguishes ground tracking from tracking? Is the launch site required to track the vehicles from the ground versus from space?

Page 98. “An applicant may use other maps in support of its application, but the applicant would be required to demonstrate an equivalent level of accuracy over the required distances, and would have to describe the consequences of any mapping errors associated with the proposed map projection.” We suggest the FAA provide clarification on “equivalent level of accuracy over the required distances”.

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[1] This proposal does not propose a means for analyzing risks posed by a launch site for the launch of unguided suborbital launch vehicles that employ FTS. Historically, few of these vehicles have been launched. In the event an applicant for a license to operate a launch site wishes to operate a launch site only for such vehicles, the FAA will handle the request on a case by case basis. The FAA does note, however, that unguided suborbital launch vehicles that in the past have been launched with an FTS were usually launched with the FTS because the launch was otherwise too close to populated areas for the type of vehicle and trajectory flown.

Page 106. The requirement for, and specifications of, an Overflight Exclusion Zone (OEZ) should be dependent on the vehicle's reliability and whether it stages. We suggest that it not be required for a highly reliable, non-staging RLV. After all, the proposed regulations compute the OEZ downrange distance based on the first major staging .

Page 12 1. "Although the FAA proposes to assume a ballistic coefficient of three as the smallest piece of wind sensitive debris hazardous to the public, ballistic coefficient is not directly related to fatality criteria based on the kinetic energy of debris. The ballistic coefficient of three is related to a kinetic energy of 58 ft/lbs which represents a probability of fatality of 50 percent for a standing person. It is therefore possible that fatalities could occur for a lower ballistic coefficient and that no fatalities may occur for a higher ballistic coefficient. The FAA proposes to incorporate neither of these conditions into this analysis, and invites comment." 58 ft-lbs is a better number to use than 11, but what is the basis for the 50% lethality claim for 58 ft-lbs and ballistic coefficient of 3. Furthermore sheltering should also be considered.

Page 125. Throughout the proposed regulations, the FAA sets corridor standards based on ". . . the maximum dispersion of the vehicle during the time necessary for a person in charge of destroying a launch vehicle to detect a vehicle failure and cause the vehicle's destruction," page 125. We suggest the FAA provide standards for vehicles that do not employ destructive termination.

Failure probability is a big issue for both this NPRM and the one for licensing RLVs. How does one determine it and how does one prove it? Ninety percent reliability is way too low for a RLV. For purposes of site licensing, We suggest no lower than ninety nine percent reliability be assumed for the analyses; this is the proven reliability of the Space Shuttle.

Page 14 1. "After an applicant has computed casualty expectancy for a flight corridor, the proposed regulations require that it be multiplied by an arbitrary factor of two". Why not be upfront about it and eliminate the arbitrary factor and set the standard at 15×10^{-6}. What is the rationale for 30×10^{-6} for the acceptable E_c ?

Appendices A-C: The assumption of expendable vehicles is implicit in much of the discussion. It's really hard to see how it would be appropriate to apply some of the procedures to a reliable RLV. There is an implicit assumption of a destructive FTS. On page 139, it says: "Finally, the probability of failure is also an element in calculating the probability of impact. The FAA proposes for the launch site location analysis to assign a failure probability (P_f) constant of $P_f = 0.10$ for guided launch vehicles." That's a far cry from 0.9998 safe recovery probability that is the goal for VS.

Page 145. "Although appendix C's approach simplifies a typical launch safety analysis somewhat by providing conservative default parameters to use, it may also prove unnecessarily complex for applicants proposing launch sites with launch corridors encompassing extremely few people. For those situations, appendix C provides the option for an applicant to further simplify the estimation of casualty expectancy by making worst-case assumptions that would produce a higher value of the corridor E_C compared with the analysis defined in appendix C, subparagraphs (c)(1)-(8). This may be particularly useful when an applicant believes E_C is well below the acceptable value.[2]" This seems to favor coastal sites.

Page 187, the proposed regulations requires that "At least two days prior to flight of a launch vehicle, the licensee shall notify local officials and all owners of land adjacent to the launch site of the flight schedule." We suggest that this should not be required for highly reliable, non-staging RLVs. If it is, what methods of notification are acceptable?

[2] The purpose of the EC analysis as part of the launch site location review is not to determine a value of EC but rather to confidently demonstrate that EC is less than the acceptable threshold value.